

## WHAT IS CLAIMED IS:

1. A process for making an epoxy resin comprising:

(a) converting a phenol or mixture of phenols to  
5 an aryl allyl ether of a phenol or mixture of phenols;

(b) converting the aryl allyl ether of a phenol  
or a mixture of phenols to an  $\alpha$ -dihydroxy derivative of a  
phenol or mixture of phenols (i) in the presence of an  
oxidant or (ii) in the presence of an oxidant and a  
10 catalyst; and

(c) converting the  $\alpha$ -dihydroxy derivative of a  
phenol or mixture of phenols to an aryl glycidyl ether  
epoxy resin of a phenol or mixture of phenols.

2. The process of Claim 1 wherein the phenol  
15 or mixture of phenols is represented by the structure of  
the following Formula VI:

Formula VI



wherein Ar is an aromatic-containing moiety;  $R^1$  is a group  
20 substituted for a hydrogen atom on the Ar moiety; OH is  
hydroxyl moiety; x is from 0 to 750; and y is from 1 to  
150.

3. The process of Claim 2 wherein the phenol  
or mixture of phenols are one or more phenols represented  
25 by any one or more of the following Formulas VII-X:

chlorine atom and the hydroxy group of the  $\alpha$ -chlorohydrin intermediate are interchanged to form a 2-chloro-3-hydroxy-1-propyl moiety.

16. The process of Claim 6 wherein step (b)  
5 comprises:

(i) reacting the  $\alpha$ -dihydroxy derivative with a hydrogen halide in the presence of a carboxylic acid to form a phenolic-based  $\alpha$ -halohydrin intermediate; or

(ii) reacting the  $\alpha$ -dihydroxy derivative with a  
10 hydrogen halide in the presence of a carboxylic acid ester to form a phenolic-based  $\alpha$ -halohydrin intermediate.

17. The process of Claim 16 in which the amount of hydrogen halide used is from about 0.5 to about 20 equivalents of hydrogen halide relative to the equivalents  
15 of  $\alpha$ -dihydroxy moieties being reacted.

18. The process of Claim 16 in which the hydrogen halide is hydrogen chloride.

19. The process of Claim 16 wherein the carboxylic acid used in (i) is from about 0.05 mole % to  
20 about 50 mole % of carboxylic acid relative to the moles of  $\alpha$ -dihydroxy derivative being reacted.

20. The process of Claim 16 wherein the carboxylic acid used in (i) is monocarboxylic acid or dicarboxylic acid having from 1 to 20 carbon atoms; or a  
25 multifunctional carboxylic acid wherein the carboxylic acid groups are attached to an inorganic, an organic, or a hybrid inorganic-organic support.

39. The process of Claim 35 wherein the at least one or more optionally used solvents may be used with or without the presence of water.

40. The process of Claim 35 wherein the amount  
5 of at least one or more optionally used solvents is from zero to about 50 parts (on a weight basis) of a single solvent or a mixture of two or more solvents to 1 part  $\alpha$ -dihydroxy derivative.

41. The process of Claim 25 including an  
10 amount of carboxylic acid ester used as solvent, and an amount of at least one or more optionally used second solvents such that the carboxylic acid ester is present in an amount that is greater than 25 mole % relative to the amount of  $\alpha$ -dihydroxy derivative.

42. The process of Claim 16 wherein the  
15 temperature is from about 0 °C to about 150 °C.

43. The process of Claim 16 wherein the pressure is atmospheric, subatmospheric or superatmospheric.

20 (44.) A process for making an epoxy resin comprising the steps of:

(a) preparing an aryl allyl ether of a phenol or mixture of phenols by reacting (i) a phenol or a mixture of phenols with (ii) an allylation agent;

25 (b) converting an aryl allyl ether of a phenol or mixture of phenols to an  $\alpha$ -dihydroxy derivative of a phenol or mixture of phenols (i) in the presence of an

oxidant or (ii) in the presence of an oxidant and a catalyst;

(c) reacting the  $\alpha$ -dihydroxy derivative prepared in step (b) with (i) a hydrogen halide and (ii) a carboxylic acid or carboxylic acid ester to form a phenolic-based  $\alpha$ -halohydrin intermediate; and

(d) converting the phenolic-based  $\alpha$ -halohydrin intermediate prepared in step (c) to an epoxy resin.

45. A product made by the process of Claim 1,  
10 Claim 16 or Claim 44.

46. The process for making an epoxy resin of Claim 1 wherein step (b) is carried out by (i) reacting the  $\alpha$ -dihydroxy derivative with a hydrogen halide and a carboxylic acid ester to form a phenolic-based  $\alpha$ -  
15 halohydrin intermediate; and (ii) converting the phenolic-based  $\alpha$ -halohydrin intermediate prepared in step (i) to an aryl glycidyl ether epoxy resin compound.